CLIMATE CHANGE

Climate and ground-level air quality are closely coupled within the atmosphere and Earth system. For example, ground-level ozone is a greenhouse gas (GHG). Particle pollution can influence global and regional climate by scattering or absorbing incoming solar radiation, and by changing cloud formation processes and cloud cover. And climate changes have effects on air quality. For example, warming of the atmosphere increases the formation of ground-level ozone, while increases in cloud cover tend to decrease ozone formation.

Figure 38 shows the trends in domestic GHG emissions over time in the U.S. The dominant gas emitted is carbon dioxide (mostly from fossil fuel combustion). Total U.S. GHG emissions increased 16 percent between 1990 and 2005. The Intergovernmental Panel on Climate Change has concluded that the Earth's climate will continue to warm as global GHG emissions increase.

Research is under way that will provide an improved understanding of the connections between air quality and climate change. Using estimates from a computer model that assumes continued growth in global GHG emissions, Figure 39 shows how ground-level ozone in the eastern U.S. may increase from current levels given future climate change. For particle pollution, the interrelationships of climate and concentrations are more complex.

For more information about emissions and trends in GHGs, visit http://www.ipcc.ch/ and http://www.epa.gov/climatechange/emissions/usinventoryreport.html. For information about what EPA is doing to address climate change, visit http://www.epa.gov/climatechange/.

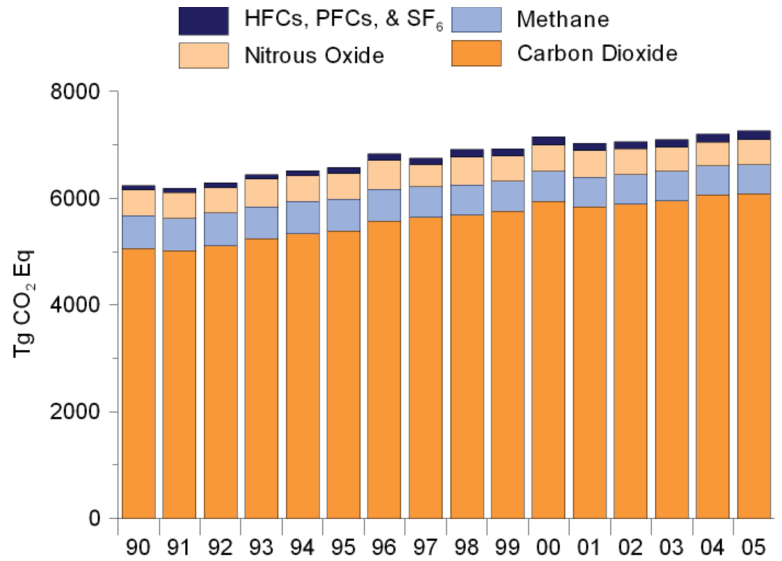


Figure 38. Domestic greenhouse gas emissions in teragrams of carbon dioxide equivalents (Tg CO_2 eq), 1990-2005. (Source: http://epa.gov/climatechange/emissions/usinventoryreport.html)

Notes: A teragram is equal to 1 million metric tons. Emissions in the figure include fluorocarbons (HFCs, PFCs) and sulfur hexafluoride (SF6).

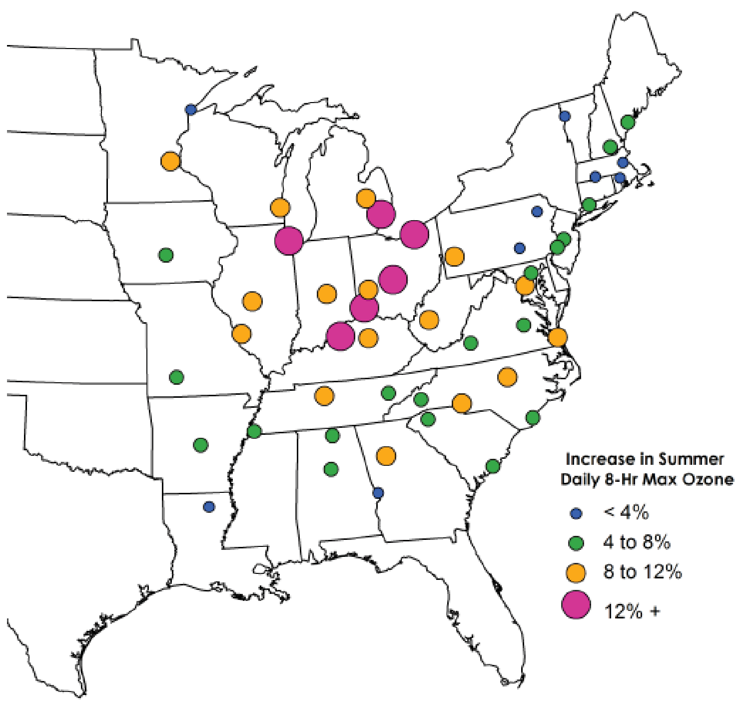


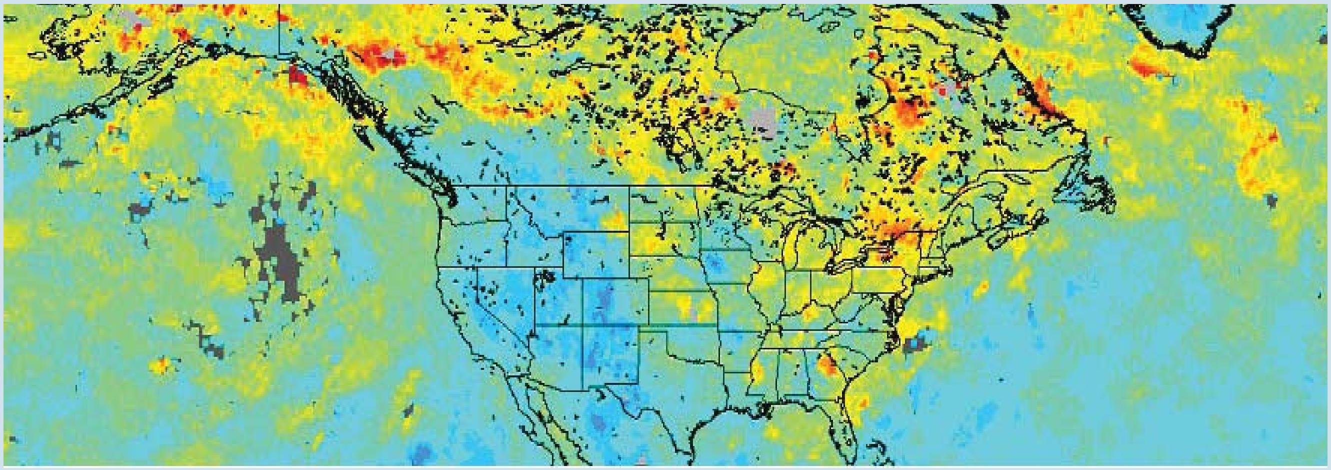
Figure 39. Predicted increases in summertime daily maximum 8-hour ozone concentrations between the 1990s and 2050s. (Source: Bell, M., et al. Climate change, ambient ozone, and health in 50 U.S. cities. Climatic Change, *Vol. 82, Numbers 1-2, May 2007, pp. 61-76)*

International Transport of Air Pollution

While domestic sources of emissions are the primary cause of air pollution in our country, the U.S. is both an importer and exporter of air pollution. Air pollution flows across boundaries — not only between the U.S. and our closest neighbors, Canada and Mexico, but also between North America, Europe, and Asia, and to some extent, between North America, Africa, and Central and South America.

Economic growth, in conjunction with increased emissions of particle pollution, mercury, and ozone precursors in developing countries, may increase background levels of these pollutants in the U.S. EPA and other agencies are working via treaties and international cooperative efforts to address the international transport of air pollution. For information about the Task Force on Hemispheric Transport of Air Pollution, an international panel on which EPA serves, visit http://www.htap.org/.

The figure below illustrates how pollution can move. In the summer of 2004, NASA researchers sampled a variety of trace gases and aerosols (tiny particles suspended in the air) across North America. During this time, wildfires in western Canada and eastern Alaska were burning more acres than at any time in the previous 50 years. Smoke from these fires traveled eastward and southward, reaching as far as the U.S. Gulf Coast.



This figure shows, for July 12-26, 2004, the total amount of carbon monoxide, one of the pollutants emitted by wildfires, as measured by the Measurements of Pollution in the Troposphere (MOPITT) instrument aboard NASA's Terra Satellite. High levels of pollution are indicated by yellow and red colors, and blue indicates low pollution levels. (Source: National Center for Atmospheric Research/NASA)